UNITED STATES DISTRICT COURT DISTRICT OF NEW JERSEY

IN RE URETHANE ANTITRUST LITIGATION

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DEFENDANT THE DOW CHEMICAL COMPANY'S SUPPLEMENTAL DAUBERT BRIEF REGARDING ERRORS IN PLAINTIFFS' DAMAGES MODEL

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I. THE PROBLEM

On February 29, 2016 plaintiffs provided Defendant The Dow Chemical Company ("Dow") with revised materials underlying the May 25, 2012 Rebuttal Expert Report of Matthew E. Raiff, Ph.D. ("the February 29 revisions"). The February 29 revisions identify two types of transactions that should have been excluded from Dr. Raiff's prior work (but were not), which result in a swing of \$74 million in alleged damages (before trebling), and further demonstrate the general unreliability of the model.

The February 29 revisions identify transactions that were wrongly included in the model by Dr. Raiff, specifically: (1) certain foreign transactions (mostly Canadian and some Brazilian transactions) and (2) propylene oxide ("PO") transactions by Carpenter that were erroneously classified as polyol purchases.² Removing the PO and foreign transactions from the final claimed damages dataset, as plaintiffs have done, results in a reduction of damages by \$35 million based on a reduction of \$471 million in purchases during the 1994-2003 period per plaintiffs' revised numbers (and a reduction of \$663 million in purchases during the 1992-2008 period). Simple enough, right? No.

¹ In plaintiffs' proposed pretrial order dated February 8, 2016, plaintiffs included a revised damage estimate for Carpenter. *See* Ex. A (2/8/16 Draft Pretrial Order at § 4 at 2-3). The total damages calculation changed from \$616,787,349 to \$608,576,318. Subsequently, on February 22, 2016, plaintiffs' pretrial brief showed a revised damages estimate of \$581,735,110. On footnote 2 of page 26, plaintiffs state that the revisions were due to "(1) certain purchases that were neither invoiced in, nor delivered to, the United States and (2) overcharges for propylene oxide purchased by Carpenter (which was mistakenly identified by Lyondell as polyols)." On February 29, 2016 plaintiffs provided to Dow an *unsigned*, *unattributed*, one-page overview of the revisions to their damages calculation to arrive at these figures. *See* Ex. B. Dow raised this issue in Court the next day on March 1, 2016, in its opposition to Plaintiffs' Bench Brief, (ECF No. 277 at 2-3), and in Court on March 1, 2016, *see* Trial Tr. at 10:15-15:5 and March 8, 2016, *see* Trial Tr. at 124:17-127:4.

² Propylene oxide is the primary chemical input for polyols, and is a distinct product. *See* Ex. C (May 13, 2011 Revised Expert Report of Matthew Raiff ("Raiff Report")) ¶ 67.

First, uniquely in this case, Dr. Marx's ability to testify at trial is expressly conditioned on **endorsing and defending** Dr. Raiff's prior work. Dr. Marx is therefore barred from Changing Dr. Raiff's new damages estimate or modeling work. Moreover, Dow has had no opportunity to depose Dr. Marx about these revisions, and the first time it will be able to confront her with the multitude of errors discussed below will be on the stand at trial. The prejudice to Dow is obvious.

Second, as plaintiffs are well aware, simply removing transactions from the final damages calculation violates the most basic rules of modeling. The estimation of a model is a "bottoms-up" operation: it proceeds from a fixed data set taken from the benchmark period. The model itself is the result of a regression calculation that uses that specific dataset. The resulting model is then "run" on data from the alleged conspiracy period.³ If the benchmark dataset is changed, estimation must be redone and a new model is the result. *See* infra Part III (b). Plaintiffs' new damage number simply subtracts transactions from the old model without reestimating a revised one. The result is that the old model is still being used, but to support a new damages number—classic apples and oranges. The proof of this is their admission that reestimating the model results in a new, higher damages calculation.⁴

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³ See July 13, 2012 Revised Reply Report of Matthew Raiff ¶167 ("Revised Raiff Reply Report"), attached as Ex. E. Dr. Marx endorses this argument by Dr. Raiff. See Sept. 20, 2013 Rule 26 Disclosure of Leslie M. Marx, Ph.D. ("Marx Report") ¶107, attached as Ex. F.

⁴ Indeed, if the transactions are removed from the initial formulation of the model, plaintiffs' asserted damages increase by more than \$40 million from the original estimate. In other words, if plaintiffs bought \$471 million less urethanes, the result of their damage model would be approximately \$120 million dollars more after trebling. *See* March 10, 2016 Declaration of Marissa Ginn, Ph.D. ¶ 7 ("Ginn Declaration"), attached as Ex. D.

	PO & Foreign Transactions Excluded from Model Estimation	PO & Foreign Transactions Excluded From Damages Dataset Only
Change in Plaintiff Purchases for 1999-2003	\$471 million↓	\$471 million↓
Change in Damages (Before Trebling)	\$39 million ↑	\$35 million ↓
Total Damages (Before Trebling)	\$655 million	\$582 million
Total Damages (After Trebling)	\$1.97 billion	\$1.75 billion

In apparent recognition of the huge hole this reveals in their experts' work and Dr. Marx's ability to opine on causation and damages, Plaintiffs have attempted to smooth over the issue by volunteering to remove the erroneous transactions from the damages calculation only, leaving the erroneous transactions in the estimation steps of the model. This procedure reduces their claimed damages by \$35 million before trebling. Plaintiffs have bound themselves to this position by asking the jury for \$581 million in their opening statement, instead of the \$616,787,349 originally requested in their experts' reports. *See* Trial Tr. 54:16-18, Mar. 8, 2016.⁵

Third, allowing plaintiffs to proceed as they propose would not only abrogate a Court order that is now two years old, but the underlying problem adds a further dimension to plaintiffs' *Daubert* problem. Under *Daubert*, this model and plaintiffs' proposed revisions fail both fit and reliability. The very fact that the damages estimate increases by removing nearly a

⁵ Even this estimate is incorrect because plaintiffs' February 29 Revisions exclude all purchase transactions (for all purchasers) with "Brazil" as the ship-to city. However, this method excludes multiple purchase transactions for purchases shipped to the city of Brazil, Indiana. *See* Ginn Affidavit at 4 n.3. Thus, when experts for Dow re-ran the model pursuant to Dr. Raiff's procedure, they corrected this error in plaintiffs' February 29 Revisions. *See id.*

half-billion dollars in transactions when the model is re-run (as it should be) confirms the unreliability of the Raiff/Marx modeling process. But even accepting plaintiffs' proposed \$35 million reduction in damages from the backend, the model is still formulated based on irrelevant propylene oxide transactions. Moreover, the \$35 million reduction is not reliable: it does not even follow Dr. Raiff's methodology, which has its own issues. This perfectly illustrates why Dr. Marx cannot and should not be able to testify at all, let alone opine that the difference between the predicted price of the model and the actual prices charged is due to collusion and nothing else. How can a "conspiracy" possibly explain why plaintiffs allegedly paid \$40 million more in overcharges on \$471 million less in transactions during the alleged conspiracy period? The answer is clear, and it is what Dow has been saying all along. This model is a fiction designed to closely fit the benchmark period and then, when anything changes at all, Dr. Marx will claim the difference between the actual and predicted price is due to collusion and nothing else.

This memorandum first explains why Dr. Marx cannot express an undisclosed new damages estimate on the eve of trial: if Dr. Marx is unable or unwilling to defend Dr. Raiff's work as it is, she is in violation of the MDL Court's substitution order. In addition, the memorandum provides a high-level overview of the creation of the Raiff/Marx model to show exactly where the transactions should have been excluded, and then explains why Dr. Marx should be precluded from testifying at all under *Daubert*.

II. IF DR. MARX CANNOT "ENDORSE AND DEFEND" DR. RAIFF'S ORIGINAL WORK, SHE IS IN VIOLATION OF THE SUBSTITUTION ORDER.

The Court need proceed no further than the MDL Court's substitution order to conclude that any revision to Dr. Marx's testimony should be precluded. All of Dr. Marx's work in this case is controlled by prior Court order. As this Court is aware, on June 28, 2013, plaintiffs

moved to substitute Dr. Marx as an expert witness for Dr. Matthew Raiff due to Dr. Raiff's then-unavailability. *See* MDL Dkt. 2931. Dow objected, underscoring the prejudice resulting from the fact that its experts had already "shown their hand" in their rebuttal reports. *See* MDL Dkt. 2944. On August 13, 2013, the MDL Court granted plaintiffs' motion to substitute, but explicitly conditioned Dr. Marx's involvement in this case: she must only "endorse and defend Dr. Raiff's opinions." This order has been expressly adopted by this Court. *See* Jan. 25, 2015 Opinion (ECF No. 229) at 1 (citing MDL Dkt. 2974). Following substitution, at plaintiffs' request, expert discovery was reopened. Insisting that Dow's experts could not exploit the opportunity themselves, however, plaintiffs successfully sought to strike major portions of Dr. Keith Ugone's rebuttal report to the September 20, 2013 Expert Disclosure of Dr. Marx. *See* 5/16/2014 Order (MDL Dkt. 3193) at 4-13.

Before openings, counsel for Dow requested that plaintiffs not reference any changed damages estimate given the enormous problems created by plaintiffs' belated revisions. Undeterred, plaintiffs presented the revised \$581 million damages figure to the jury. *See* Trial Tr. 54:16-18, Mar. 8, 2016. This damages figure is not Dr. Raiff's. It is Dr. Marx's *new* opinion—an opinion which is known to be based on a model estimated using the *wrong data*. If Dr. Marx is unwilling or unable to defend Dr. Raiff's opinions (errors and all), then she is in direct violation of the MDL Court's order limiting her involvement in this case and she should be precluded from testifying.

As of this date, there has been no attempt to properly supplement Dr. Marx's opinion to include the additional step in methodology of subtracting the PO and foreign transactions from Dr. Raiff's initial damages estimate, or to make any other revision to her Rule 26 disclosure. As noted above, Dow was informed about these changes only through the new final damages figures

provided by counsel in plaintiffs' proposed pretrial order and trial brief, and through an unsigned, unattributed overview provided by counsel. None of the communications Dow received from plaintiffs' counsel meet the requirements for an expert disclosure under Rule 26(a)(2), as they were not "prepared and signed" by Dr. Marx and do not contain "a complete statement of ... the basis and reasons" for why the models' final calculation of \$616 million can then be reduced to \$581 million. *See* Fed. R. Civ. P. 26(a)(2). Even further, any attempt by Dr. Marx to formally present the methodology for the \$581 million damages figure on the stand at trial would thus also be untimely. *See* Fed. R. Civ. P. 26(e)(2). Given Dr. Marx's failure to properly amend her expert disclosure at this late stage, Dow has had no opportunity to depose Dr. Marx on these revisions and thus is highly prejudiced by the any belated disclosure, and Dow's analysis of this complicated issue remains on-going.

III. PLAINTIFFS' REVISIONS SHOULD BE BARRED AS PATENTLY WRONG AND UNRELIABLE BASED UPON THE UNDISPUTED REQUIREMENTS OF MODELING METHODS.

A. How the Model Works

As an initial matter, to understand the problems associated with plaintiffs' eleventh hour revisions to the Raiff/Marx model, it is important to briefly review how the model translates actual prices to a measurement of damages for an individual plaintiff's purchases. At a high-level, there are eight steps in two stages.

1. First Stage Benchmark Model

Step One: Market-wide transactions for the three "benchmark" products are selected: TDI 80/20, polymeric MDI, and conventional flexible slab ("CFS") polyols.⁶ **Step Two:** Transactions that do not meet Dr. Raiff's criteria are excluded from the selected transactions.

⁶ Revised Raiff Report, ¶ 231.

These include: non-U.S. transactions;⁷ inter-supplier sales (*e.g.*, Dow sales to BASF); non-standard unit of measure (*i.e.*, not pounds or kilograms); negative or missing quantity; no invoice date; no purchaser indicated on the invoice; and a price greater than \$10 per pound or less than \$0.10 per pound.⁸ **Step Three:** After irrelevant transactions are excluded in Step Two, Dr. Raiff creates a monthly weighted median actual price for each benchmark product, where the weights are the quantities associated with a given transaction.⁹ **Step Four:** Regressions are then run to "fit" the benchmark period (1992-1993 and 2004-2008) and variables are selected using Dr. Raiff's approach combining mandatory variables and the Akaike Information Criteria ("AIC") to determine which combination of "optional" variables, when combined with his pre-determined mandatory variables, will be included in the estimation of the model. *See* 5/26/11 Raiff Dep. at 432:2-435:11. **Step Five:** Using the variables and coefficients created in Step Four, "but for" prices are then "predicted" for the alleged conspiracy years based on the selected supply and damage factors and the previous predictions of the model.¹⁰

2. Second Stage Transaction-Level Model

Step Six: In the "second stage," of the model, plaintiffs' transactions for each product by supplier are isolated. For example, if multiple plaintiffs all purchased the same product, *e.g.*, Dow's Isonate 125 Pure MDI, their transactions are considered as a group for Step Seven. **Step Seven:** A regression is run to determine if the price of the specific product, *e.g.*, Dow Isonate

⁷ Revised Raiff Report, Appendix E (p. 220): "I was instructed to calculate overcharges on purchases made by Plaintiffs and their predecessors-in-interest in the United States. Some datasets contained a bill-to location and ship-to location. Purchases were identified as —'US' if either one of these fields contained a location in the United States or else otherwise instructed by counsel as described in Appendix C."

⁸ Revised Raiff Report, footnote 344.

⁹ 5/26/11 Raiff Dep. at 545:19-22.

¹⁰ Revised Raiff Report, ¶¶ 279-280.

125 Pure MDI, has a "systematic relationship" with the weighted median price of the benchmark product for that product family (*i.e.*, MDI, TDI or Polyols) according to Dr. Raiff's criteria. ¹¹ If it does, estimated overcharges are calculated for the specific product based on the modeled relationship between the prices. ¹² If a product's price does not have a "systematic relationship" to the weighted median benchmark product price, overcharges are "imputed" based on overcharges for products that are deemed comparable by Dr. Raiff. ¹³ Transactions are determined to be comparable for this imputation process using a variety of criteria, including the purchaser, supplier, product class, product name, invoice year, invoice month, and product family. The set of criteria used to determined comparable transactions is gradually reduced until two products may have only the invoice year and month in a given product family in common to "impute" an overcharge. **Step Eight:** Transaction-specific damages are calculated by multiplying the transaction-specific overcharges by purchases. ¹⁴ Total purchases and damages by each plaintiff are summed up to produce the final, total damages estimate.

B. The Erroneous Data changes the Model.

As plaintiffs have conceded, Dr. Raiff made two significant errors in the selection of data (Step Two and Step Six). First, he included propylene oxide purchases by Carpenter, which were wrongly categorized as polyols in his data. Second, in contravention of the requirement in Step Two to exclude non-U.S. transactions, Dr. Raiff included Canadian, Brazilian and other

¹¹ *Id.*, ¶¶ 283-285.

¹² *Id.*, ¶¶ 286-287.

¹³ *Id.*, ¶ 288.

¹⁴ *Id.*, ¶ 289.

non-U.S. transactions (primarily Canadian transactions and other non-U.S. transactions involving Woodbridge). ¹⁵ *See* Ginn Declaration ¶ 6.

Although Dr. Raiff first attempts to remove all non-U.S. transactions from his operative dataset, in a subsequent adjustment he adds back in Canadian transactions for plaintiffs and certain Woodbridge transactions outside of the U.S. and Canada. If these transactions are no longer considered for damages, then Dr. Marx should have excluded them from the start of the model estimation from Step Two, not just from the final damages calculation, Step Eight. Similarly, for the PO transactions, these should have unambiguously been excluded from the start of the model estimation in Step Six. In other words, the benchmark product and transaction-level models (*i.e.*, the first and second stages) should have been re-run from the beginning and re-estimated with these transactions excluded. When doing this, the damage estimate increases by nearly \$40 million in relation to plaintiffs' original damages. Specifically, damages for MDI decrease by \$1.7 million, damages for TDI decrease by \$5.6 million and damages for polyols increase by \$46.0 million. *See* Ginn Declaration ¶ 7.

In addition, the incorrectly included transactions are important enough that, if plaintiffs had estimated the first stage of their damages model after excluding these transactions, the variables selected in plaintiffs' polyols model would have changed. *See* Ginn Declaration ¶ 6. Specifically, when re-estimating the CFS polyols benchmark model without the incorrectly included transactions, the AIC procedure no longer selects the variable "change in the lag of the log(CFIPI)." *See id.* The model includes the "change in the lag of the log(wage)" variable

¹⁵ Plaintiffs may suggest that they are not required under the Foreign Trade Antitrust Improvements Act to exclude these transactions. This is wrong, and in any event, plaintiffs cannot have some foreign transactions excluded and some included and still claim the model is reliable. In any event, under plaintiffs' February 29 Revisions, the model is still estimated using irrelevant propylene oxide transactions.

instead. *See id*. The associated coefficient for this new control variable (*i.e.*, the "change in the lag of the log(wage)") is 0.525 (as opposed to -0.547 for the "change in the lag of the log(CFIPI) in the original model). *See id*. Further, the coefficient on the "lag of the log(CFIPI)" variable doubles in magnitude (going from -0.017 to -0.034). *See id*.

CFS Polyol Benchmark Model Variables	PO & Foreign Transactions Excluded from Model Estimation	PO & Foreign Transactions Excluded From Damages Dataset Only
Change in the Lag of the Log(CFIPI) Variable	Not Included	Included
Change in the Lag of the Log(Wage) Variable	Included	Not included
Coefficient for Lag of the log(CFIPI)	-0.034	-0.017

In other words, this is a **different model** for polyols because it has different variables and different coefficients from Dr. Raiff's model. *See id*.

C. The Raiff/Marx Models should be excluded under Daubert.

As the Court is aware, to be admissible, expert testimony must be both reliable and relevant (*i.e.*, it must "fit"). *See Daubert v. Merrill Dow Pharms.*, 509 U.S. 579, 589 (1993). Dr. Marx's proposed testimony is neither.

1. The Raiff/Marx Models Are Not Reliable.

Concerning reliability, the Supreme Court has explained that "[t]he subject of an expert's testimony must be 'scientific ... knowledge.' The adjective 'scientific' implies a grounding in the methods and procedures of science. Similarly the word 'knowledge' . . . 'applies to any body of known facts or to any body of ideas inferred from such facts or accepted as truths on good grounds.'" *Id.* at 589-90. Here, Dr. Marx's analysis is, without question, unreliable: Even assuming that Dr. Raiff's report disclosed a reliable methodology (which we dispute), Dr. Raiff's

report *did not follow his own stated methodology*, but instead included much data that plaintiffs have belatedly admitted should have been excluded in the first place. In other words, the model in Dr. Raiff's report is estimated based on transactions which are irrelevant to this litigation. As the United States Court of Appeals for the Third Circuit has explained, "[a]ny step that renders the [expert's] analysis unreliable under the *Daubert* factors renders the expert's testimony inadmissible." *In re Paoli R.R. Yard PCB Litig.*, 35 F.3d 717, 745 (3d Cir. 1994); *see also Rutigliano v. Valley Business Forms, Inc.*, 929 F. Supp. 779, 786 (D.N.J. 1996) (citing *Paoli*).

Moreover, Dr. Raiff's work in this litigation has been littered with errors. For example, during his second deposition, Dr. Raiff realized on examination that the statistical significance (p-value) tests of his MDI and polyols models were erroneous. This led him to correct his reply report as he could no longer claim statistical significance for all three of his benchmark product category models. *Compare* Raiff 5/25/12 Original Reply Report ¶ 114 ("[m]y overcharges are statistically significant"), attached as Ex. G, with Raiff 7/13/12 Revised Reply Report ¶ 118 (discussing "practical" significance for the first time), ¹⁶ attached as Ex. E; see also 6/27/12 Raiff Dep. at 297-313. In addition, Dow has raised several other challenges to the reliability of these models because, *inter alia*, the models: (1) are "over fit" to the benchmark periods, which differ substantially from the alleged conspiracy period, (2) employ a novel hybrid variable selection approach, which had the effect of overriding a purely objective variable selection approach, (3) use demand variables with negative coefficients that cause the models to predict lower prices

¹

¹⁶ Specifically, Dr. Raiff completely re-wrote the vast majority of Section 3.8 of his Reply Report, including changing the title of Subsection 3.8.2 from "My overcharges are statistically significant" to "Confidence intervals and hypothesis testing" and arguing for "practical significance" over statistical significance. Dr. Raiff's Revised Reply Report ¶119 argues that traditional statistical significance thresholds are arbitrary and unnecessary, a claim that was not in his original Reply Report. Dr. Marx then further calculated confidence intervals for the overcharges estimated by Dr. Raiff. Marx Report ¶¶84-88.

when demand goes up, (4) arbitrarily exclude 2004 from the damages calculation, (5) do not include any measure of capacity utilization and negotiation leverage, which has a pronounced effect on pricing negotiations (according to plaintiffs' own witnesses), and (6) fail to predict prices in the benchmark period when those periods are "held out" from the estimation of the model. *See* Dow's Initial *Daubert* Br. (ECF No. 198) at 25-49.

2. The Raiff/Marx Models Do Not "Fit" Because They Are Based On Irrelevant Transactions.

Rule 702 also requires that "the evidence or testimony 'assist the trier of factor to understand the evidence or to determine a fact in issue.' This condition goes primarily to relevance." *Daubert*, 509 U.S. at 591. The Third Circuit has explained that a "consideration under Rule 702—and another aspect of relevancy—is whether expert testimony proffered in the case is sufficiently tied to *the facts of the case* that it will aid the jury in resolving a factual dispute." *United States v. Downing*, 753 F.2d 1224, 1242 (3d Cir. 1985) (emphasis added). Here, Dr. Marx's proposed opinions are admittedly based on facts *not* tied to the case—since plaintiffs seek to withdraw them—and are instead tainted with much data from sales outside the United States and from non-polyurethanes products. Dr. Marx's model must also be excluded as irrelevant.

* * *

CONCLUSION

For the foregoing reasons, Dow respectfully requests that the Court bar Dr. Marx from testifying or, failing that, enter an order prohibiting Dr. Marx from presenting any analysis inconsistent with the opinions expressed by Dr. Raiff.

Respectfully submitted,

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CERTIFICATE OF SERVICE

On March 10, 2016, I caused a copy of the foregoing to be served on all counsel of record via ECF.

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